

CLAIMS

WHAT IS CLAIMED:

1. A method for controlling a photolithography process, comprising:

forming a first layer on a selected wafer;

measuring a first overlay error associated with the first layer;

forming a second layer on the selected wafer; and

determining at least one parameter of an operating recipe for performing a photolithography process on the second layer of the selected wafer based on at least the first overlay error measurement.

2. The method of claim 1, further comprising performing the photolithography process on the second layer based on the operating recipe.

3. The method of 1, wherein determining the at least one parameter in the operating recipe further comprises determining the at least one parameter in the operating recipe of a photolithography tool.

4. The method of 1, wherein determining the at least one parameter in the operating recipe further comprises implementing a control thread associated with the performing of the photolithography process on the second layer.

5. The method of 1, wherein measuring the first overlay error further comprises measuring the first overlay error using a review station.

6. The method of 1, wherein measuring the first overlay error further comprises measuring the first overlay error using a scatterometry tool.

7. The method of claim 1, wherein determining the at least one parameter in the operating recipe further comprises determining at least one of an x-translation parameter, a y-translation parameter, an x-expansion wafer scale parameter, a y-expansion wafer scale parameter, a reticle magnification parameter, a reticle rotation parameter, a wafer rotation parameter, and a wafer non-orthogonality parameter.

8. A method for controlling a photolithography process, comprising:
forming a first layer on a selected wafer;
measuring a first overlay error associated with the first layer to generate a feedforward overlay error signal;
measuring a plurality of overlay errors associated with a process for performing a photolithography process on a second layer formed on a plurality of wafers to generate a feedback overlay error signal; and
determining at least one parameter in an operating recipe for performing a photolithography process on the second layer formed on the selected wafer based on the feedforward overlay error signal and the feedback overlay error signal.

9. The method of claim 1, further comprising performing the photolithography process on the second layer of the selected wafer based on the operating recipe.

10. The method of 8, wherein determining the at least one parameter in the operating recipe further comprises determining the at least one parameter in the operating recipe of a photolithography tool.

5 11. The method of 8, wherein determining the at least one parameter in the operating recipe further comprises implementing a control thread associated with the performing the photolithography process on the second layer.

10 12. The method of 8, wherein measuring the first overlay error further comprises measuring the first overlay error using a review station.

13. The method of 8, wherein measuring the first overlay error further comprises measuring the first overlay error using a scatterometry tool.

15 14. The method of 8, wherein measuring the plurality of overlay errors associated with the process for forming the second layer further comprises measuring the plurality of overlay errors using a review station.

20 15. The method of 8, wherein measuring the plurality of overlay errors associated with the process for performing the photolithography process on the second layer further comprises measuring the plurality of overlay errors using a scatterometry tool.

16. The method of claim 1, wherein determining the at least one parameter in the operating recipe further comprises determining at least one of an x-translation parameter, a y-

translation parameter, an x-expansion wafer scale parameter, a y-expansion wafer scale parameter, a reticle magnification parameter, and a reticle rotation parameter.

17. The method of claim 9, wherein the second layer comprises an exposed photoresist layer, and measuring the plurality of overlay errors associated with the process for forming the second layer further comprises measuring the overlay error in the exposed photoresist layer.

18. The method of claim 9, wherein the second layer comprises a developed photoresist layer, and measuring the plurality of overlay errors associated with the process for forming the second layer further comprises measuring the overlay error in the developed photoresist layer.

19. A processing line, comprising:

a photolithography stepper configured to process wafers in accordance with an operating recipe;

an overlay metrology tool configured to measure overlay errors associated with the processing of the wafers in the photolithography stepper; and

a controller configured to receive a first overlay error measurement associated with the formation of a first layer on a selected wafer and determine at least one parameter in the operating recipe for performing a photolithography process on a second layer formed on the selected wafer based on at least the first overlay error measurement.

20. The processing line of claim 19, wherein the photolithography tool further is further configured to perform the photolithography process on the second layer on the selected wafer based on the determined operating recipe.

5 21. The processing line of 19, wherein the controller is further configured to implement a control thread associated with the performing of the photolithography process on the second layer for determining the at least one parameter.

10 22. The processing line of 19, wherein the overlay metrology tool further comprises a review station.

23. The processing line of 19, wherein the overlay metrology tool further comprises a scatterometry tool.

15 24. The processing line of claim 19, wherein the at least one parameter further comprises at least one of an x-translation parameter, a y-translation parameter, an x-expansion wafer scale parameter, a y-expansion wafer scale parameter, a reticle magnification parameter, and a reticle rotation parameter.

20 25. A processing line, comprising:
a photolithography stepper configured to process wafers in accordance with an operating recipe;
an overlay metrology tool configured to measure overlay errors associated with the processing of the wafers in the photolithography stepper; and

a controller configured to receive a feedforward overlay error signal including a first overlay error measurement associated with the formation of a first layer on a selected wafer, receive a feedback overlay error signal including a plurality of overlay error measurements associated with a photolithography process performed on a second layer on a plurality of wafers, and determine at least one parameter in the operating recipe for performing a photolithography process on the second layer on the selected wafer based on the feedforward overlay error signal and the feedback overlay error signal.

26. The processing line of claim 25, wherein the photolithography tool further is further configured to perform the photolithography process on the second layer on the selected wafer based on the determined operating recipe.

27. The processing line of 25, wherein the controller is further configured to implement a control thread associated with the performing of the photolithography process on the second layer for determining the at least one parameter.

28. The processing line of claim 25, wherein the at least one parameter further comprises at one of an x-translation parameter, a y-translation parameter, an x-expansion wafer scale parameter, a y-expansion wafer scale parameter, a reticle magnification parameter, and a reticle rotation parameter.

29. The processing line of claim 25, wherein the overlay metrology tool comprises an optical review station.

30. The processing line of claim 25, wherein the overlay metrology tool comprises a scatterometry tool.

31. The processing line of claim 25, wherein the second layer comprises a photoresist layer.

32. The processing line of claim 31, wherein the photoresist layer comprises an exposed photoresist layer.

33. The processing line of claim 31, wherein the photoresist layer comprises a developed photoresist layer.

34. A processing line, comprising:
means for forming a first layer on a selected wafer;
means for measuring a first overlay error associated with the first layer; and
means for determining at least one parameter in an operating recipe for performing a photolithography process on a second layer formed on the first wafer based on at least the first overlay error measurement.

35. A processing line, comprising:
means for forming a first layer on a selected wafer;
means for measuring a first overlay error associated with the first layer to generate a feedforward overlay error signal;

means for measuring a plurality of overlay errors associated with a process for performing a photolithography process on a second layer formed on a plurality of wafers to generate a feedback overlay error signal; and

means for determining at least one parameter in an operating recipe for forming the second layer on the selected wafer based on the feedforward overlay error signal and the feedback overlay error signal.

5